



Imaging Magnetic Fields in the Orion Nebula with SOFIA



Observing magnetic fields inside giant, star-forming clouds of dust and gas is difficult, yet we know these fields must play an important role in star formation. Is there a way to probe deep into a nebula to measure the strength and shapes of the magnetic fields inside?

One method is to measure the polarization of light inside the nebula, which is produced by strong magnetic fields lining dust grains up in a preferred direction, similar to how polarized sunglasses only let through a portion of the light. If a region of the nebula is strongly polarized, the magnetic field must be strong. In addition, infrared light is much better at getting through dust than visible light, so observing the polarization of infrared light should give us a view of conditions deep inside the nebula

The HAWC+ polarimetric camera on NASA's airborne SOFIA Observatory has made far-infrared observations of the Orion Molecular Cloud. These images reveal the relationships between the temperature, density, and magnetic field conditions in the cloud. The Orion Nebula is about 1,000 light-years from Earth and is readily visible in the night sky. It serves as a nearby example of a stellar "nursery" with numerous young stars. Using polarization of infrared light, we hope to better understand the conditions needed for stars, and entire planetary systems, to form.

An image of the Orion Nebula with lines showing the magnetic field from polarization measurements "...the future's so bright - gotta wear shades..."



J.M. Michail, P.D. Aston, M.G. Berthoud, M.G., D.T. Chuss, C.D. Dowell (JPL), J.A. Guerra, D.A. Harper, G.A. Novak., F.P. Santos, J. Siah, E. Sukay, A. Taylor, L.N. Tram, J.E. Vaillancourt, E.J. Wollack (GSFC), "Far-Infrared Polarization Spectrum of the OMC-1 Star-Forming Region", 2021, *Astrophysical Journal*, 907:46